Forrest also states definitely that he found rhododendrons with their roots actually spreading in the crevices of the limestone rock.

From the evidence of Mr. Forrest and Lady Wheeler-Cuffe it would appear that these particular rhododendrons must come in contact with a large quantity of lime, but, unfortunately, we have no definite information as to the particular character of the limestone rocks on which they have been found.

In the European Alps the two endemic species of rhododendron, *R. ferrugineum* and *R. hirsutum*, are recognised as being chalk-avoiding and chalk-loving respectively. *R. ferrugineum* is found in damp, deep-layered soil rich in humus, and it will only grow in a limestone region when there is an overlying layer of humus. *R. hirsutum,* on the other hand, is a limestone rock plant, found in dry, open situations, and when the two species are found in the same locality, *R. hirsutum* grows only on the rocks, while *R. ferrugineum* occurs in the pockets of humus. The hybrids which have been raised in gardens with *R. hirsutum* as one of the parents are also lime-loving, like that species.

Several of the new Chinese rhododendrons which were collected on limestone are now being experimentally cultivated in this country on various lime-containing soils. Some of the species (see Grove in *Gardeners' Chronicle,* January 29, 1916, p. 65) appear to thrive under these conditions very well, while to others the lime has proved fatal, but the experiments have not been in progress for a sufficiently long time for a definite verdict as to the behaviour of these limestone rhododendrons under cultivation to be given.

The abhorrence of lime by the humus-loving rhododendrons appears to be intimately connected with the mycorrhiza, the symbiotic fungus which lives in association with the roots of the rhododendron and heath family (Ericaceæ), and performs the functions of the root-hairs in absorbing water from the soil; and it may be that the mycorrhizal fungi associated with the humus-loving forms of rhododendron are physiologically, if not specifically, distinct from those of the lime-loving species.

It has recently been shown by Rayner, Jones, and Tayleur (*New Phytologist,* vol. x., 1911, pp. 227–240) that the common ling, *Calluna vulgaris,* though it is sometimes found on chalk downs, is really growing in pockets of loamy soil rich in mineral constituents but poor in lime. It is also worthy of note that in the "limestone pavement" district of Westmorland ling grows vigorously in the very thin layers of earth which lie directly on the limestone rock. An analysis of the surface soil, however, reveals an almost complete absence of lime, and so lime-free is this layer that it is actually necessary to add lime thereto in the course of ordinary agricultural operations.

Cultures made by C. A. Weber and Graebner (see Graebner, "Lehrbuch der Allgemeinen Pflanzenphysiographie," 1910, p. 236) have shown that the lime-avoiding Ericaceæ and other plants they examined suffer from lime only when this is associated with a large amount of soluble salts, and that root-formation fails when nutritive salts are in abundance in the presence of lime. Rhododendrons, however, do not appear to have been among the plants examined.

In connection with their behaviour towards lime-containing soils, plants may be roughly divided into two groups: of those which avoid lime, the heath family affords one of the most striking examples, but, contrary to expectation, certain members of the family, as, for instance, *R. hirsutum,* are characteristic plants of limestone districts.

It seems probable from the evidence now before us that some of Forrest's newly discovered Chinese rhododendrons, as also the one found by Lady Wheeler-Cuffe, must be reckoned as lime-loving species, but in all these cases the interesting question as to the quantity of lime absorbed by the plants growing on limestone rock still awaits an answer. Under natural conditions these lime-loving rhododendrons are flourishing on what we should consider a very sterile medium, and it may be that the poor growth which such plants exhibit when grown in lime-containing soil in our gardens is due to the superabundance of soluble nutritive salts, which may cause the lime to react unfavourably on the mycorrhiza of the roots, and that, under certain chemical conditions, the lime may have a definitely toxic influence. A. W. H.

NOTES.

AT a meeting of the council of the National Museum of Wales held at Cardiff on October 28, it was announced that a sum of 10,000*l.* had been received in War Loan Scrip from Capt. W. R. Smith, senior partner of the firm of W. R. Smith and Son, Cardiff, and Mrs. Smith towards the building fund of the new museum. The generous donors had made this gift in the belief that the National Museum would be one of the first educational influences in the Principality. There were other donors, who wished to remain anonymous for the present, and it is expected that when the present contract has been paid there will be a balance of about 16,000*l.* towards the 50,000*l.* which is needed to complete the furnishing and equipment of the portion of the building at present in course of erection.

DEALING with the fine collection of statues of eminent Welshmen at Cardiff unveiled by Mr. Lloyd George, a correspondent, writing in the *Western Mail,* points out with regret that no man of science figures in the series. He says that Robert Record, of Tenby, who flourished in the first half of the sixteenth century, might well have been included. Record was a man of cyclopædic knowledge, and was most eminent in his time, though little known to modern Welshmen. The use of the sign = to denote equality was introduced by him in 1557. He was "the first mathematician who wrote on arithmetic in English; the first who wrote on geometry in English; the first who introduced algebra into England; the first who wrote on astronomy and the doctrine of the sphere in English; and, finally, the first Briton (in all probability) who adopted the system of Copernicus." As a statue or two are still to be added, perhaps science may yet be represented in the Welsh Valhalla.

Lord Rayleigh presided at a meeting held at University College, London, on Tuesday, October 31, to take steps to establish a memorial to the late Sir William Ramsay. Mr. J. A. Pease, M.P., Postmaster-General, in moving that a memorial fund should be raised, to be utilised in promoting chemical teaching and research, under a scheme to be approved hereafter, said he was glad on behalf of the Government to pay a tribute to the memory of Sir William Ramsay and to take part in the great object of the meeting. The memorial should be not merely national, but international. Sir J. J. Thomson seconded the motion, which was supported by the Belgian Minister, who wished to convey the respectful homage of Brussels University, and by Mr. W. H. Buckler, who testified to the interest of the American Ambassador and his countrymen in the movement. The resolution was carried. It was also agreed that the meeting should resolve itself into a general committee, with Lord Rayleigh as chairman, to raise the necessary fund, and an executive committee was appointed to circulate an appeal.

A new departure in the study of Indian phonetics and linguistics is marked by the presentation before the Royal Asiatic Society, by Sir G. Grierson, head of the Linguistic Survey of India, of a series of gramophone records of four languages of the Munda group, prepared under the orders of the Government of Behar and Orissa. These comprise the Kharia, Mundari, Ho, and Santali, and one of the Dravidian group, Kurukh. In each case a version of the tale of "The Prodigal Son" has been reproduced, with some marriage songs and items of folklore. The work is important because the Munda tongues are a widespread group, extending through India proper to Assam, Burma, thence to Indo-China and the Malay Peninsula, and eastward to Easter Island. A copy of these records will be deposited at the India Office Library, a second in the British Museum, and a third in the rooms of the Asiatic Society. It is significant that this new record of phonetics is produced just as the first director of the School of Oriental Studies has been appointed. It may be hoped that similar records for other Indian languages may be prepared, and the scheme might be extended to other languages taught in our schools.

The Chinese Government is becoming alive to the need for a proper geological investigation of the mineral resources of the country, and the lead in this task has been entrusted to Swedes. As the head of the survey, Dr. J. G. Andersson, formerly chief of the Swedish Geological Survey, has been appointed, and with him already are Dr. Tegengren and Prof. U. Nyström. We now learn that Dr. T. G. Halle, assistant in the palæobotanical department of the Riksmuseum at Stockholm, is to travel in China for one year, mainly in the interests of his own department, for which he will collect Palæozoic plants, but partly for the Chinese Government, to which he will report on the age and character of the coal-seams inspected, and for which a duplicate series of fossils will be provided after their determination. A young Chinese geologist will accompany Dr. Halle, and will be trained by him as a palæobotanist. The spring and summer will be devoted to the northern provinces, especially Shansi, with its enormous deposits of anthracite and ordinary coal. The coal-field of greatest scientific interest lies round and south of the Yangtse river, but how far this can be visited must depend on political conditions, now considerably disturbed. The expenses are borne by friends of the Swedish museum, but naturally every assistance will be given by the Central Government at Pekin.

A paper on food economics, by Prof. G. Lusk, in the Journal of the Washington Academy of Sciences for June 19, is worthy of study by everyone, and especially by those sending parcels of foodstuffs to prisoners in Germany. Prof. Lusk describes briefly how Germany tackled the all-important question of foodstuffs at the outbreak of the war. In order to maintain the protein portion of the nation's food the committee of investigation recommended that considerable increase should be made in the bean crop in Germany. Modifications were put forward in connection with the production of cereals, cheese, and skim milk, and it was finally concluded that the German people, through the co-operation of millions of inhabitants, would be able to obtain a ration of 3000 calories per adult per day, and so escape suffering from lack of food. A prisoner of war, doing moderate work, could get along on a ration of 2500 calories, composed as follows:—Proteins, 100 grams; carbohydrates, 400 grams; fats, 50 grams. On the assumption that a gram (roughly 15½ grains) of protein yields 4·1 calories, and that the corresponding values for carbohydrates and fats are 4·1 and 9·3 respectively, it is obvious that the total caloric value of this ration is about 2500. Prof. Lusk points out that true food reform demands the sale of food by calories and not by pounds, and he gives an instructive table of various articles of food, showing the weight and price of each necessary to produce 2500 calories. The following are some of the foodstuffs mentioned, and their costs in New York:—Oatmeal, 1 lb. 5½ oz., 2¾*d.*; wheat flour, 1 lb. 8 oz., 3*d.*; sugar, 1 lb. 5½ oz., 3½*d.*; rice, 1 lb. 8½ oz., 3¾*d.*; bread, 2 lb. 1 oz., 4*d.*; lard, 9½ oz., 4¼*d.*; potatoes, 8 lb. 1 oz., 8*d.*; raisins, 1 lb. 12 oz., 10½*d.*; cheese, 1 lb. 3 oz., 11¾*d.*; butter, 11 oz., 12*d.*; cocoa, 1 lb. 1 oz., 14½*d.*; lentils (dried), 1 lb. 8 oz., 15*d.*; salt cod, 6 lb., 45*d.*

Officers of the Royal Artillery and the Royal Engineers, besides a large circle of friends in the teaching profession, will learn with deep regret of the sudden death, on October 18, of Mr. C. S. Jackson, Instructor of Mathematics and Mechanics at the Royal Military Academy, Woolwich. Before entering as a scholar of Trinity College, Cambridge, Mr. Jackson was head of Bedford School. He was eighth Wrangler in 1889, in the following year took the premier place in Part II. of the Law Tripos, and was called to the Bar shortly afterwards. In 1891 he joined the staff of the R.M. Academy, and for the past twenty-five years worked there with rare distinction and single-hearted devotion. He was a member of the council of the Mathematical Association, and took a prominent part on the various committees of that body, the reports of which have done so much to improve the mathematical teaching of our schools. He was also the first president of the London branch of this association. His great knowledge of the educational requirements of the country was recognised by the Board of Education when, in connection with the International Congress of Mathematicians, which met at Cambridge in 1912, it was determined to issue a series of reports dealing with the teaching of mathematics in secondary schools. The organisation of the work in connection with these reports was put into the hands of Mr. Jackson, and they form a lasting tribute to his far-sighted outlook on mathematical education. His work at Woolwich brought him into contact with the applications of mathematics to the problems of gunnery and military engineering. Working on these lines, he became a pioneer in breaking down the barrier that so long existed between so-called rational mechanics, as taught in our schools, and mechanics as applied to the problems of civil and military engineering.

THE *Nieuwe Courant* reports the death, at sixty-three years of age, of Prof. A. Torp, of the University of Christiania, the most famous of Norwegian philologists.

ACCORDING to the *Chemisch Weekblad*, the Bakhuis Roozeboom medal has been awarded to Prof. Schreinemakers, professor of inorganic and physical chemistry in the University of Leyden.

WE notice with much regret, in the *Times* of October 30, the announcement of the death, at seventy-seven years of age, of Prof. Cleveland Abbe, the well-known meteorologist of the U.S. Weather Bureau, Washington, D.C

THE Horace Dobell lecture of the Royal College of Physicians of London will be delivered by Dr. H. R. Dean on November 7. The subject will be "The Mechanism of the Serum Reactions." On November 14 and 16 Dr. W. H. R. Rivers will give the FitzPatrick lectures on "Medicine, Magic, and Religion" (part 2).

DR. E. D. VAN OORT's report on the activities of the State Museum of Natural History at Leyden for the year ended September 1, 1916, records the transference of the collections to the new building in the Van der Werf Park, but laments that even now the collections are totally inaccessible to the public at large, owing to the lack of any exhibition galleries. The retirement, after forty-five years' service, of Dr. C. Ritsema Czn, keeper of the entomological collections, is a great loss to the museum. He is succeeded by R. van Eecke.

OWING to the pressure of his duties at Columbia University, Prof. M. H. Whitaker has resigned the editorship of the *Journal of Industrial and Engineering Chemistry*, one of the official organs of the American Chemical Society. He will be succeeded in that post by the president of the society, Prof. C. H. Herty, who will relinquish at the end of the year his duties as head of the department of chemistry at the University of North Carolina in order to devote his whole time to editorial work.

THE death is announced, in his seventy-fifth year, of Dr. Albert J. Cook, professor of zoology and entomology at the Michigan Agricultural College from 1866 to 1893, and afterwards professor of biology at Pomona College, California. From 1894 to 1905 he superintended the university extension work in agriculture in connection with the University of California. Prof. Cook is said to have been the first to make kerosene emulsion (in 1877), and to demonstrate and advocate the use of the arsenites as a specific against the codling moth (in 1880). He was the author of a manual of the apiary, and also of publications on "Injurious Insects of Michigan," "Silo and Silage," "Maple Sugar and the Sugar Bush," and "Birds of Michigan."

CAPT. J. O. WAKELIN BARRATT, who is serving with the British Expeditionary Force in France, writes:—"On October 17, at 9 p.m., an exceptionally fine lunar rainbow was visible in the west at Etaples (the moon had risen in the east). The width of the rainbow was fully equal to that of a solar rainbow, but no colour was recognisable, the rainbow being of a uniform light grey appearance." Full moon was on October 11—six days earlier—so that the atmospheric conditions must have been very favourable for a lunar rainbow to be distinctly visible. Such rainbows are usually faint, and their colours are not easily distinguished on this account. They generally have the appearance of a whitish or yellowish arch, except when the moon is full and other conditions are good, in which case colours may be seen, as in a solar rainbow.

THE sixth war course of Chadwick public lectures began on October 27 with a lecture on the physiological basis of fatigue by Prof. W. Stirling at the Royal Society of Arts. Prof. Stirling will give two other lectures on the effects of fatigue on industry and efficiency on November 3 and 10 at the same place at 5.15 p.m. Dr. C. Porter will deliver three lectures at Norwich Museum during November on the health of the future citizen. Dr. J. T. C. Nash will lecture at the Hampstead Central Library on November 20 on baby-saving for the nation; and Mr. P. Waterhouse will give three weekly lectures at the Surveyors' Institution, London, on architecture in relation to health and welfare, beginning on November 30. The lectures are free, and particulars concerning them can be obtained from the offices of the Chadwick Trust, 40 (6th) Queen Anne's Chambers, Westminster.

WE regret to note that *Engineering* for October 27 records the death, on October 7, of Col. T. Turrettini. Col. Turrettini was born in 1845, and his experience in hydraulic and electric machinery led to his election as one of the experts for the harnessing of the Niagara Falls in 1891. He was president of the Swiss National Exhibition held in Geneva in 1896. In the same number of *Engineering* is also recorded the death of Sir Henry Benbow, a prominent naval engineer officer of the past generation. In the Nile expedition of 1885 Sir Henry Benbow's name appears in the official despatch for his brilliant feat of repairing the boilers of the rescuing steamer under heavy fire, thus saving Sir Charles Wilson and his shipwrecked comrades. He was promoted to chief inspector of machinery in 1888, and was placed on the retired list at his own request in 1893.

SEVERAL further letters have reached us upon the subject of the scarcity of wasps during the past summer. The abundance of queen wasps referred to by correspondents last week seems to have been noticed in many districts. Mr. C. F. Butterworth, writing from Poynton, Cheshire, seven miles from Stockport, says:—"The queen wasps were much more numerous this year than I have known them during quite ten well-observed years, when I have kept honey bees and regarded these things with interest." Mr. K. Evershed, Kenley, Surrey, noticed a number of queen wasps in the spring, but adds, as to wasps in general:—"I do not recollect so marked a scarcity during the last thirty-five years in this county." Mr. V. E. Murray says that in the Reading district also their numbers have been considerably below the average. He adds:—"In July I observed early wasps on the flowers of Scrophularia (which they fertilise), and during the autumn, while engaged on a study of ivy, particularly as regards its fertilisation (in which they also take part), I have noticed a sprinkling of these insects obtaining honey from the discs of the flowers, this being the only occasion on which I have seen even a moderate number assembled. It was interesting to observe these wasps now and again preying on the numerous flies also attracted by the honey, bearing their victims to the ground and killing them after a short, fierce struggle. In one case when a wasp had finished feeding on a fly the head of the latter was found to have been severed from the trunk, and in another instance, when I disturbed a wasp killing a fair-sized fly, it flew off, carrying its prize bodily away!"

THE Harveian oration was delivered by Sir Thomas Barlow, at the Royal College of Physicians, on October 18. The story of Harvey's life and of his great discovery of the circulation of the blood have often been told, and Sir Thomas Barlow dwelt on certain minor, but none the less important, details of Harvey's life before proceeding to consider Harvey as physician and as Court physician to Charles I., his Oxford life, his great discovery and work on generation, and his relations with the College of Physicians. Harvey was a pupil at King's School, Canterbury, and gained there a scholarship which enabled him to proceed to Caius College, Cambridge. The regulations for this scholarship, founded in 1571 by Matthew Parker, Archbishop of Canterbury, are probably unique for the period, and enjoined that the scholar should be educated first in subjects that pertain, or are serviceable, to medicine, and then in subjects which actually constitute medicine itself. In 1600 Harvey entered the University of Padua, and studied anatomy under the learned Fabricius, returning home in 1602, became a fellow of the College of Physicians in 1607 and attached to St. Bartholomew's Hospital, with which he was connected for thirty-six years. Sir Thomas Barlow's estimate of this side of Harvey's life is that, besides being a great anatomist and naturalist, he was an experienced pathologist, a learned physician, and had the qualifications of a good, all-round practitioner. The College of Physicians was the chief interest of his old age, and he enriched it with many benefactions. The last exhortation of the great master was "ever to search out and study the secrets of Nature by way of experiment, and for the honour of our profession to continue in mutual love and affection among ourselves."

SOME weeks ago there was considerable speculation as to the truth of the reports concerning Germany's new super-Zeppelins, and the matter was referred to in these columns. Since that date two Zeppelins of the very latest type have been brought down in England, and one in such a state of preservation that detailed information has been readily obtained from it. Excellent descriptions of this airship have appeared in the daily papers, and a particularly correct account in the *Times* for October 19. All the main particulars of the early reports are justified. The capacity of the L33 has been estimated at 2,000,000 cub. ft., its length at 680 ft., and the total horse-power at about 1500, which entirely confirms the figures previously given in these columns. More information is now available concerning the minor details of the new design. A point worthy of particular notice is the centralisation of the controls, the whole airship being under the control of the men in the forward gondola. Bombs and petrol tanks are carried in a passage-way along the keel of the ship, which also serves for communication between the various gondolas. The extent of the development of small details is illustrated by the fact that provision has even been made for dropping the petrol tanks in case of emergency, to save all possible lifting power. The bomb-releasing arrangements are exceedingly neat and trustworthy, and an armament of nine machine-guns has been provided. The construction of the main framework is very ingenious, the strength being enormous for the weight of metal used. In view of the great improvements in the design of these latest Zeppelins, it is comforting to think that our defensive measures have proved so successful against them, and that the raiders no longer enjoy the comparative immunity from loss which characterised the earlier raids.

WE have received the report of the Director-General of Public Health, New South Wales, for the year ended December 31, 1914. It contains a summary by the Director-General, Dr. Paton, of the general public health administration, reports of the work of the various departments and of the State hospitals, and the report of investigation and research work of the microbiological laboratory. The routine examination of rats and mice for plague infections forms a part of the work of this laboratory, and it is of interest that no plague infection has been found since 1910 among these rodents, although some 60,000 animals have been examined during the years 1911–14 inclusive.

PHYSICIANS and psychologists will find a critical discussion of the value and limitations of the intelligence tests in diagnosing the mind of a child, in the *Psychological Review* (vol. xxiii., No. 5). The writer, Mr. J. V. Haberman, finds the Binet method entirely inadequate to furnish an accurate or truthful equation of the general intellectual ability of an individual, and, further, insists that even if general ability were so tested it would be of no diagnostic value to the psychopathologist, since in mental pathology the processes involved are not always of the nature of general ability, but of mental functioning. He suggests a method of testing which shall serve in diagnosis, prognosis, and prophylaxis, and that shall give a clue to therapy and remediable pedagogic processes. He also points out that this testing should not be in the hands of the psychologist only, but of a physician with a psychological training. The increasing importance now being attached to tests renders the criticism of an expert pertinent and valuable.

IN the numbers of *Scientia* for September and October, 1916, Prof. Eugenio Rignano writes the two parts of an elaborate and interesting psychological study of what he calls "intentional" reasoning. In *Scientia* during last year he published several articles concerned with the psychological analysis of reasoning, and the present contributions complete this analysis. In the reasoning previously considered, the reasoner, at least at the moment when he begins his reasoning, has no intention to support certain theses at the expense of certain others, but only that of discovering the truth. On the other hand, the "intentional" reasoner sets about reasoning for the purpose of proving the correctness of definite assertions which he has at heart. Prof. Rignano's work is divided into two main parts, which deal with the two chief varieties of "intentional" reasoning: dialectical reasoning and metaphysical reasoning. The latter part is subdivided into sections on metaphysical theology; metaphysics properly speaking; finalism, animism, and vitalism; the function of language in metaphysical reasoning; and positivism and metaphysics. These researches are particularly interesting at the present time, when the attention of many philosophers and men of science is fixed on scientific method in philosophy, and some philosophers are gradually coming to recognise in their work that in philosophy, just as in what is usually called science, only an unbiassed search for truth is really legitimate and can lead to permanent results. Of course, this seems a truism when stated thus as a maxim of method, but it is none the less a fact that philosophers have not, as a rule, hitherto worked in accordance with it.

DR. W. D. MATTHEW, in the Bulletin of the American Museum of Natural History (vol. xxxv.), describes in great detail "A Marsupial from the Belly River Cretaceous." The remains forming the subject of this communication comprise no more than the left ramus of the mandible, the symphysis of the right mandible, and fragments of the cranium, but they constitute the most complete remains of fossil mammals yet discovered in the Cretaceous. These remains are assigned the rank of a new genus and species—*Eodelphis Browni*—of the family Cimolestidæ, which is not clearly separable from the Didelphidæ. The specimen was discovered during the work of undermining a Ceratopsian skull, beneath which it lay. Being thus accidentally found during work with a heavy pick, it was badly shattered, but it is believed that all the fragments originally preserved have been recovered.

MR. E. C. CHUBB, the curator of the Durban Museum, is to be congratulated on the admirable "General Guide" which he has prepared for the aid of visitors, a copy of which has just reached us. Mr. Chubb has evidently made the most of the collections under his charge, though it would seem that great gaps have to be filled, even in so far as African mammals are concerned. If we may judge from this guide, neither the elephant nor the giraffe is yet represented here. When a new edition of this guide is issued we would suggest that the statement that the "lamp-shells," or Brachiopods, are possibly related to the starfishes should be corrected, while in regard to the information concerning flexible sandstone the fact might be added that it is found in India and Brazil. At the present time the Durban Museum occupies no more than the first floor of the south block of an imposing pile of buildings serving also as an art gallery and public library, and apparently yet other functions. In the course of time it is to be hoped the Natural History Department will either oust its rivals or find new and more commodious quarters elsewhere; as matters stand, the space allotted to it is inadequate.

MR. E. P. MEINECKE, in U.S. Dept. Agric. Bulletin, No. 275, entitled "Forest Pathology in Forest Regulation," gives the results of an investigation, as regards the incidence of wounds and disease, of 160 felled trees of *Abies concolor*, varying in age from 60 to 258 years. These trees were representative of the ordinary condition of the species under natural forest conditions in Oregon. Only one-fourth of the trees were found to be free from wounds. The rest had all been injured at one time or another by lightning, fire, frost-crack, etc., or by a combination of these, and as the wounds permitted infection by fungi, decay had set in. After the trees had reached eighty or ninety years of age, 70 per cent. were more or less badly wounded; and at 106 years, 80 per cent.; but serious decay of the timber rarely set in until about the age of 130 years. Fire, usually caused by lightning, is the greatest enemy. The management of the forest should be modified by the pathological conditions, as it is evident that much may be done to avert decay and destruction of valuable timber by timely removal of wounded and badly suppressed trees, and by fixing the felling rotation at 130 to 150 years.

THE richness of Sweden in water-power, and Denmark's natural poverty in any sources of power, has led to Sweden exporting electric power across the Sound. The works are established in the small river Låga, in Småland, and the current is carried by overhead wires to Helsingborg, and thence by three submarine cables under the waters of the Sound to Marienlyet, north of Elsinore, on the island of Seeland. According to *La Géographie* (vol. xxxi., No. 2), the Swedish power station sends 500 h.p. to Denmark, but the company undertakes to increase this to 5000 h.p. Precautions have been taken so far as possible to prevent the cables being fouled by the anchors of ships.

THE Royal Italian Geographical Society has issued as one of its special memoirs a handbook and index to the names which appear on the Austrian Staff map (1 : 75,000) of the Alto Adige, the new province of Italy lying north of the Trentino ("Prontuario dei nomi locali dell' alto Adige"). The index itself, apart from the introduction, runs to more than one hundred pages, and contains all the names on the fourteen sheets of the map, with their Italian equivalents. Pending the preparation of a new map, this index should be of great value, as many of the places are difficult to identify from the German versions of their names, which often bear no relation to the Italian. The work has been done under the direction of Signor E. Tolomei.

WITH the view of increasing the commercial utility of cobalt, Dr. H. T. Kalmus, of Queen's University, Kingston, Ontario, has carried out a number of investigations of the physical properties of the metal and its alloys for the Mines Branch of the Department of Mines of Canada. The fifth of these investigations deals with the magnetic properties of pure cobalt and of the alloy Fe_2Co, and has been conducted by Dr. Kalmus and Mr. K. B. Blake. The B, H curves of both materials have been obtained by the Burrows method in use at the American Bureau of Standards. For pure cobalt the value of B for $H=100$ is only about 5000, while older observations had given 8000. At $H=150$ B has risen to 6300, and shows no sign of the material being magnetically saturated. The Fe_2Co alloy, when cast, is very liable to fine cracks, but after forging is more than twice as strong as pure iron. At low fields its magnetic permeability is less than that of pure iron, but at fields exceeding 8 it is greater, and for fields of the order 50 to 200 is approximately 25 per cent. greater. The hysteresis loss is considerably less than that of transformer steel, and its electrical resistance about the same as that of pure iron.

A PAPER by the late Lieut. F. Trevor Wilkins (Northumberland Fusiliers), read at the Institution of Mechanical Engineers on October 20, gives an account of some trials of a small Diesel engine at the University of Birmingham. The manner of conducting these trials and reducing the results enabled figures to be presented additional to those usually given in such investigations. The indicator diagrams have been redrawn upon a heat-energy chart, and by this means any differences between the theoretical and practical cycles are clearly exhibited. The amounts of heat passing to the cylinder walls and to the exhaust were determined accurately. The heat flow during the compression and expansion strokes was estimated separately, and the period during which this heat flow takes place was indicated definitely. At full load the thermal efficiency, heat to jackets, and heat to exhaust are respectively 42·1, 29·6, and 28·3 per cent., these being the results of the test. The corresponding figures from the energy diagrams are 42·5, 25·3, and 32·2 per cent.

OUR ASTRONOMICAL COLUMN.

THE FIREBALL OF OCTOBER 20.—Mr. Denning writes that forty-six observations of this brilliant object have reached him. It was seen from widely distant stations, the most northerly being Rothes (Elgin), and the most southerly Totteridge (Herts) and Bristol. The fireball was a splendid one, and it traversed a long flight of about 252 miles, from over a place 60 miles N.W. of Edinburgh to 50 miles E. of Whitby, Yorks. Its elevation decreased from 68 to 25 miles, and its velocity was about 17 miles per second. The radiant point was near ζ Herculis, situated low in the N.W. by W. sky at the time of the apparition. There is no well-known meteor shower from this region in the autumn, but bright meteors have sometimes been observed from the same astronomical point at various times of the year, and this point near ζ Herculis forms the chief focus of a well-defined meteoric shower visible during the last half of May.